# Commonwealth of Northern Mariana Islands (CNMI)

## Contact Information

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## Program Description

**NOTE: Since few freshwater sources exist on the islands, all information in this program summary refers to CNMI's marine environments (CNMI has only two or three, very small, perennial streams. CNMI's dynamic tropical marine system requires different approaches and techniques than are used by the states to develop biocriteria.)**

The objective of CNMI's Marine Monitoring Program is to monitor CNMI's reefs, lagoon, and reef flats with regards to benthic communities, macroinvertebrate and fish abundances, and water quality. In addition, CNMI has a biodiversity list of all organisms encountered in CNMI and a reference collection. CNMI Water Quality Standards clearly state that benthic communities can not be altered due to a discharge (Section 7.12 (d)). Any significant changes would be changes from 1) previous conditions at the same site or 2) changes from a similar reference site. The goal is to gather as much baseline data in as many different areas as possible to use for comparisons. Last year, a "State of the Reef Report" was completed which comprises all of the results from monitoring efforts.

In 2001, the focus was on assessments of nearshore coral reef systems surrounding Saipan and Rota. The 2000/2001 *State of the Reef Reports* were produced summarizing past and present coral reef data for Saipan and Rota. Though it would be impossible to survey the entire coral reef system around CNMI with current resources, there are approximately 20 sites established for intensive data collection on a yearly basis. The goal is to continue to enhance CNMI's interagency marine monitoring group composed of Coastal Resources Management, Division of Fish and Wildlife, and Division of Environmental Quality. Assessments of existing and additional sites on Rota, Saipan, Tinian, and other Northern Islands will be conducted and included in the next Reef Report (2002). Data will be used for future assessments of natural disasters, potential anthropogenic disturbances/development, and overall biological health.

In 2002, the entire Saipan Lagoon, covering several watersheds, will also be surveyed to assess and understand how upland runoff (nonpoint source pollution) may be affecting this valuable resource. The entire lagoon will be divided into habitats and quantitative and qualitative data from each habitat will be gathered. Once completed, existing aerial photographs will be scanned and remote sensing techniques will delineate the habitats found. The end result will be used to examine correlations between water quality, drainage areas, other areas of concern, and the lagoon habitat. This project is also required by the Army Corps of Engineers in order to proceed with a master drainage plan for areas associated with Saipan's Lagoon. Lagoon survey work is currently a joint project between NOAA's Coastal Resource Management Program and DEQ. Hopefully, the Division of Fish and Wildlife will be involved in this project in 2002 as well.

CNMI's reef monitoring program is based on site selection. Sites that have "concerns" or "disturbances" are selected, as well as several reference sites. There are many more habitats in the nearshore coral reef communities around CNMI than are found in the Saipan Lagoon, hence the difference in methods. Also, weather conditions prohibit surveys on windward sides of the islands most of the year. All of this data is very useful for understanding baseline water quality conditions, and these data are used for assessment when and if projects are proposed that involve a discharge.

CNMI's program can not follow the same type of biocriteria monitoring program implemented in any of the U.S. states. There is a very dynamic tropical marine system surrounding CNMI which warrants the use of techniques different than those used by our State counterparts.

## Documentation and Further Information

*Commonwealth of Northern Mariana Islands Water Quality Assessment Report 305(b)*, April 2000

*Commonwealth of Northern Mariana Islands Water Quality Assessment Report 305(b)*, 2002
(Interested parties can contact Peter Houk, CNMI DEQ, or EPA Region 9 for a copy of either report)

CNMI *State of the Reef Report*, 2000

CNMI *Nonpoint Source and Marine Monitoring Program* information: http://www.deq.gov.mp/NPS/default.htm

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## Programmatic Elements

| | | |
|---|---|---|
| **Uses of bioassessment within overall water quality program** | ✓ | problem identification (screening) |
| | ✓ | nonpoint source assessments |
| | ✓ | monitoring the effectiveness of BMPs |
| | ✓ | ALU determinations/ambient monitoring |
| | ✓ | promulgated into state water quality standards as biocriteria |
| | ✓ | support of antidegradation |
| | ✓ | evaluation of discharge permit conditions |
| | | TMDL assessment and monitoring |
| | ✓ | other: public information and awareness |
| **Applicable monitoring designs** | ✓ | targeted (i.e., sites selected for specific purpose) *(special projects only)* |
| | ✓ | fixed station (i.e., water quality monitoring stations) *(comprehensive use throughout jurisdiction)* |
| | | probabilistic by stream order/catchment area |
| | | probabilistic by ecoregion, or statewide |
| | | rotating basin |
| | | other: |

## Stream Miles* (pertains to coral reef monitoring)

| | |
|---|---|
| **Total miles** | **–** |
| Total perennial miles | – |
| **Total miles assessed for biology** | **n/a** |
| fully supporting for 305(b) | n/a |
| partially/non-supporting for 305(b) | n/a |
| listed for 303(d) | n/a |
| number of sites sampled on the reef *(on an annual basis)* | 20 |
| number of miles assessed per site | site specific |

*The above section is not applicable to CNMI's monitoring program since no stream monitoring is conducted. For lagoon surveys, CNMI plans to intensively survey and create habitat maps for the entire Saipan Lagoon system. This covers several watersheds. CNMI's outer reef monitoring program is based on site selection - sites that have "concerns" or "disturbances," as well as several reference sites. There are many more habitats in the nearshore coral reef communities around CNMI than are found in the Saipan Lagoon, hence the difference in methods. Also, weather conditions prohibit surveys on windward sides of the islands most of the year. All of these data are very useful for understanding baseline water quality conditions, and these data are used for assessment when and if projects are proposed that involve a discharge.

## Aquatic Life Use (ALU) Designations and Decision-Making

| | | |
|---|---|---|
| **ALU designation basis** | Class System (A,B,C) | |
| **ALU designations in state water quality standards** | AA - top quality marine, A - marine non-recreational<br>1 - surface water (runoff mainly, no rivers) highest quality,<br>2 - surface water non-recreational | |
| **Narrative Biocriteria in WQS** | Formal/informal numeric procedures used to support narrative biocriteria are determined by the best available data. | |
| **Numeric Biocriteria in WQS** | none (Numeric biocriteria are located in yearly reports on monitoring activities. Each site differs with respect to benthic communities and CNMI's WQS uses the term "shall not differ substantially from those where similar conditions exist.") | |
| **Uses of bioassessment data in integrated assessments with other environmental data** (e.g., toxicity testing and chemical specific criteria) | ✓ | assessment of aquatic resources |
| | | cause and effect determinations |
| | | permitted discharges |
| | | monitoring (e.g., improvements after mitigation) |
| | | watershed based management |
| **Uses of bioassessment/ biocriteria in making management decisions regarding restoration of aquatic resources to a designated ALU** | A ponding basin was established on Rota Island in response to CNMI DEQ's monitoring results. There are also other small projects similar to this. DEQ is collecting baseline data with the intention of using it to assess BMPs and aid future decision-making. | |

## Reference Site/Condition Development

| | | |
|---|---|---|
| **Number of reference sites** | **5 total** | |
| **Reference site determinations** | ✓ | site-specific |
| | | paired watersheds |
| | | regional (aggregate of sites) |
| | ✓ | professional judgment |
| | ✓ | other: based on benthic community composition |
| **Reference site criteria** | Reference sites are chosen based on similar geological/physical features (slope, substrate, etc.). They are sites similar in community composition that are not subjected to the discharge in question. There are usually several on each island in CNMI. | |
| **Characterization of reference sites within a regional context**<br>*Not applicable** | | historical conditions |
| | | least disturbed sites |
| | | gradient response |
| | | professional judgment |
| | | other: |
| **Stream stratification within regional reference conditions**<br>*Not applicable* | | ecoregions (or some aggregate) |
| | | elevation |
| | | stream type |
| | | multivariate grouping |
| | | jurisdictional (i.e., statewide) |
| | | other: |
| **Additional information** | ✓ | reference sites linked to ALU *(in some cases)* |
| | | reference sites/condition referenced in water quality standards |
| | ✓ | some reference sites represent acceptable human-induced conditions *(in some cases)* |

*Characterization of reference sites does not apply because CNMI uses a degree of community change based on reference versus test sites.

## Field and Lab Methods*

| | | |
|---|---|---|
| **Assemblages assessed** | ✓ | benthos *(<100 samples/year; single season, multiple sites - broad coverage)* |
| | ✓ | fish *(<100 samples/year; single season, multiple sites - broad coverage)* |
| | | periphyton |
| | ✓ | other: waterfowl *(100-500 samples/year; multiple seasons, multiple sites - broad coverage for watershed level)* |
| **Benthos*** | | |
| sampling gear | | Transect lines, underwater photo equipment, hammer, measuring tapes, diving gear, underwater slates/pencils |
| taxonomy | | genus and species |
| **Fish*** | | |
| sampling gear | | speargun, reference books |
| taxonomy | | species |
| **Habitat assessments** | | quantitative measurements, benthic coverage estimates of major benthos, basic water quality parameter measurements, abundances of fish and macroinvertebrates, and biodiversity of all organisms present; performed with bioassessments |
| **Quality assurance program elements** | | standard operating procedures, quality assurance plan, periodic meetings and training for biologists, and specimen archival |

*Following is a summary of biological sampling methods used in the reef – see CNMI's *State of the Reef Report* for details

- Three 50 meter transect lines are secured parallel to the shoreline (laid end-to-end, 150m total length), and marked with a sediment trap holder and re-bar driven securely into the reef.
- For benthics, an underwater camera is used to take still photographs of .5-m quadrats placed at all even numbers along the transect line. For each photo the bottom right corner of the quadrat is aligned with the corresponding transect line distance.
- Coral communities are examined using the point-quarter method described by Randall et al., (1988). A dive knife is haphazardly tossed 16 times along the three transects. For each toss the distance to the nearest living coral colony is noted for each of four quadrants, as well as the diameter and taxonomic name.
- Fish abundance is determined by a single observer swimming along the transect lines recording data. Counts of all fishes within 5 meters of each side of the transect line are recorded. Fishes are identified to the family level.
- All macroinvertebrates within 2 meters of each side of the transect line are counted. These data were presented as abundances per (100-m^2) of reef on each of three transects. Macroinvertebrates are either identified to genus or grouped by life form, depending on abundances.
- Sediment traps provide sedimentation rate data from sites where sedimentation is a concern.
- Water samples are taken for chemistry.

## Data Analysis and Interpretation

| | | |
|---|---|---|
| **Data analysis tools and methods** | ✓ | summary tables, illustrative graphs |
| | ✓ | parametric ANOVAs |
| | ✓ | multivariate analysis |
| | | biological metrics |
| | | disturbance gradients |
| | ✓ | other: distribution analysis and cluster analysis |
| **Multivariate thresholds** | | |
| defining impairment in a multivariate index | | $5^{th}$ percentile of reference population (Pvalue of .05 is cut off) |
| **Evaluation of performance characteristics** | ✓ | repeat sampling |
| | | precision |
| | | sensitivity |
| | | bias |
| | | accuracy |
| **Biological data** | | |
| Storage | | MS Access, Excel, Word, Arcview GIS and Photo documentation |
| Retrieval and analysis | | Excel |